SAFER cycling: from crash avoidance to injury reduction – increased visibility and reduction of injuries by smart clothes and materials

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Detect cyclist

- Most common accident scenario on rural roads is that the bicyclist is struck while cycling along the road
- Even if most of the accidents occurred in daylight conditions drivers claims that they did not see the cyclist

Source: Kullgren et al 2019

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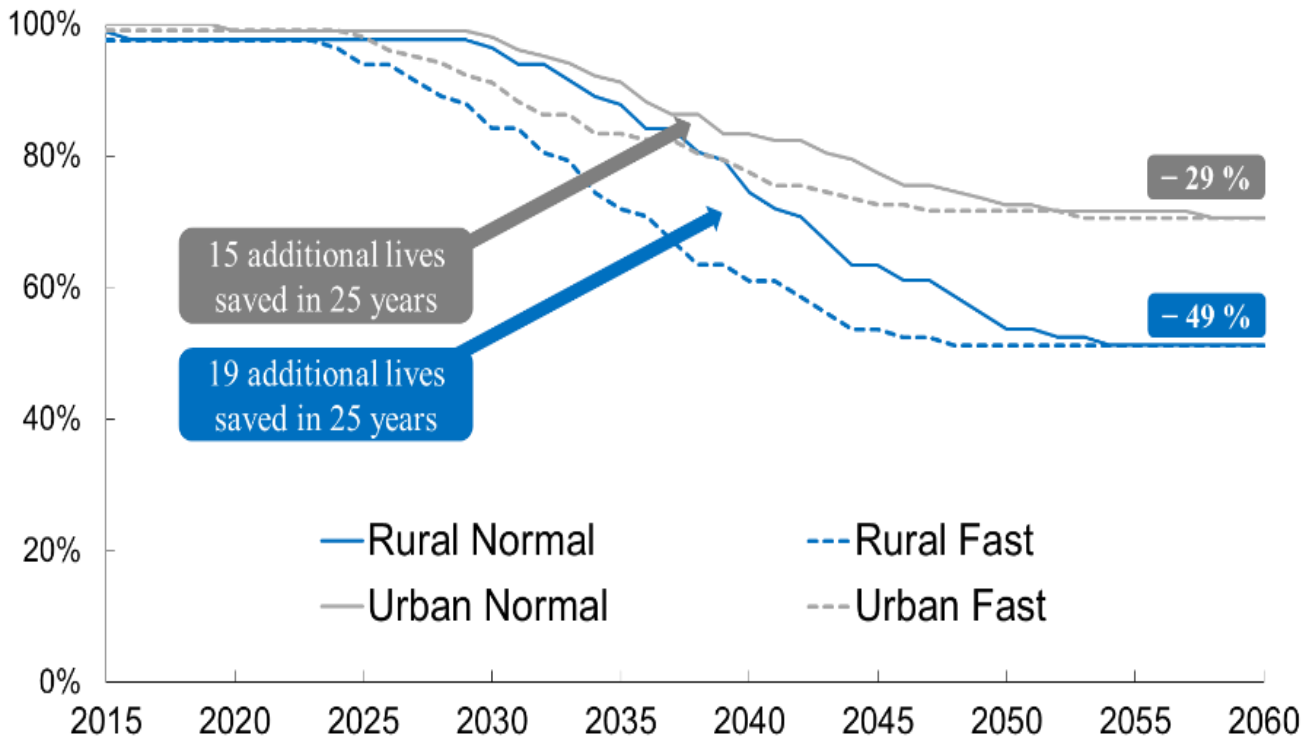
Future estimate of fatally injured bicyclists due to vehicle technology

- Maximum effect regarding saved lives is expected year 2050
- Majority of fatalities would still remain in 2030
  - Important to speed up the implementation
  - Any other sulutions?



Source: Kullgren et al 2019

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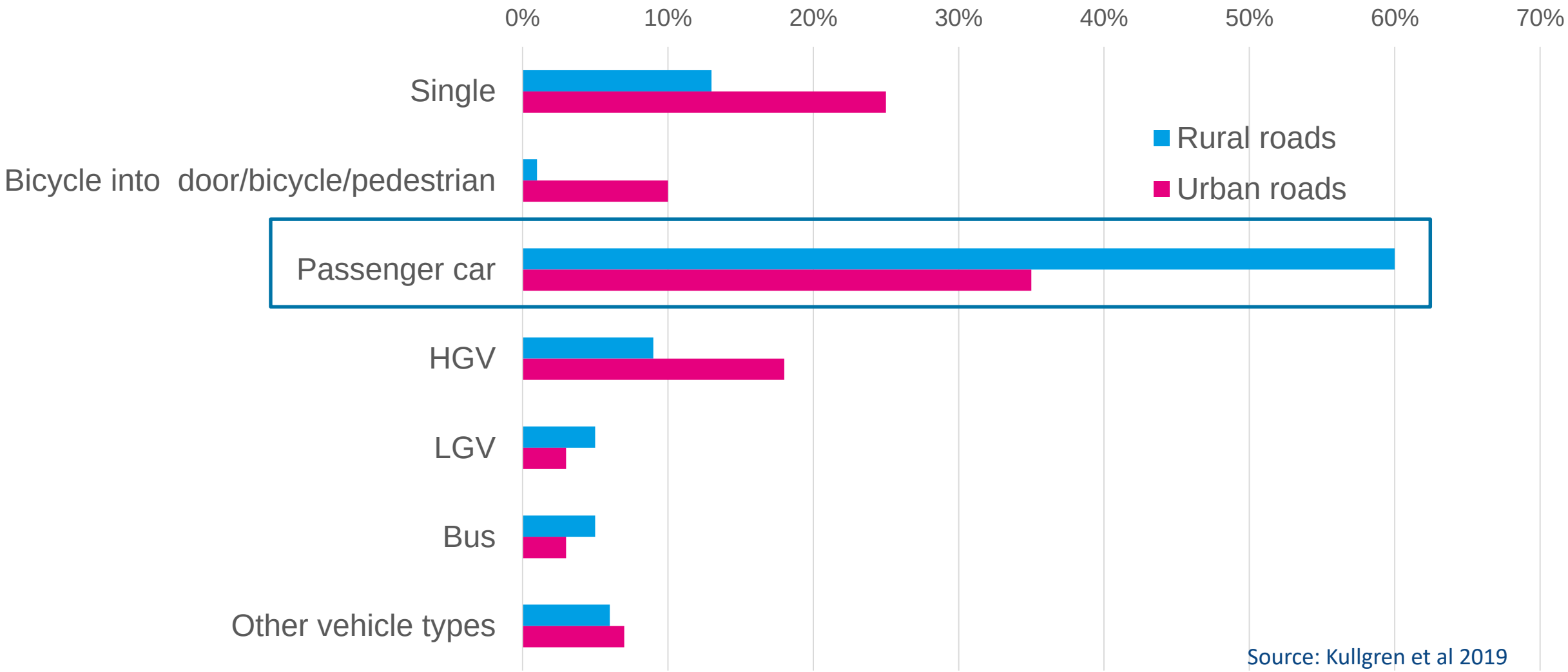
Distribution of fatalities per vehicle type



Source: Kullgren et al 2019

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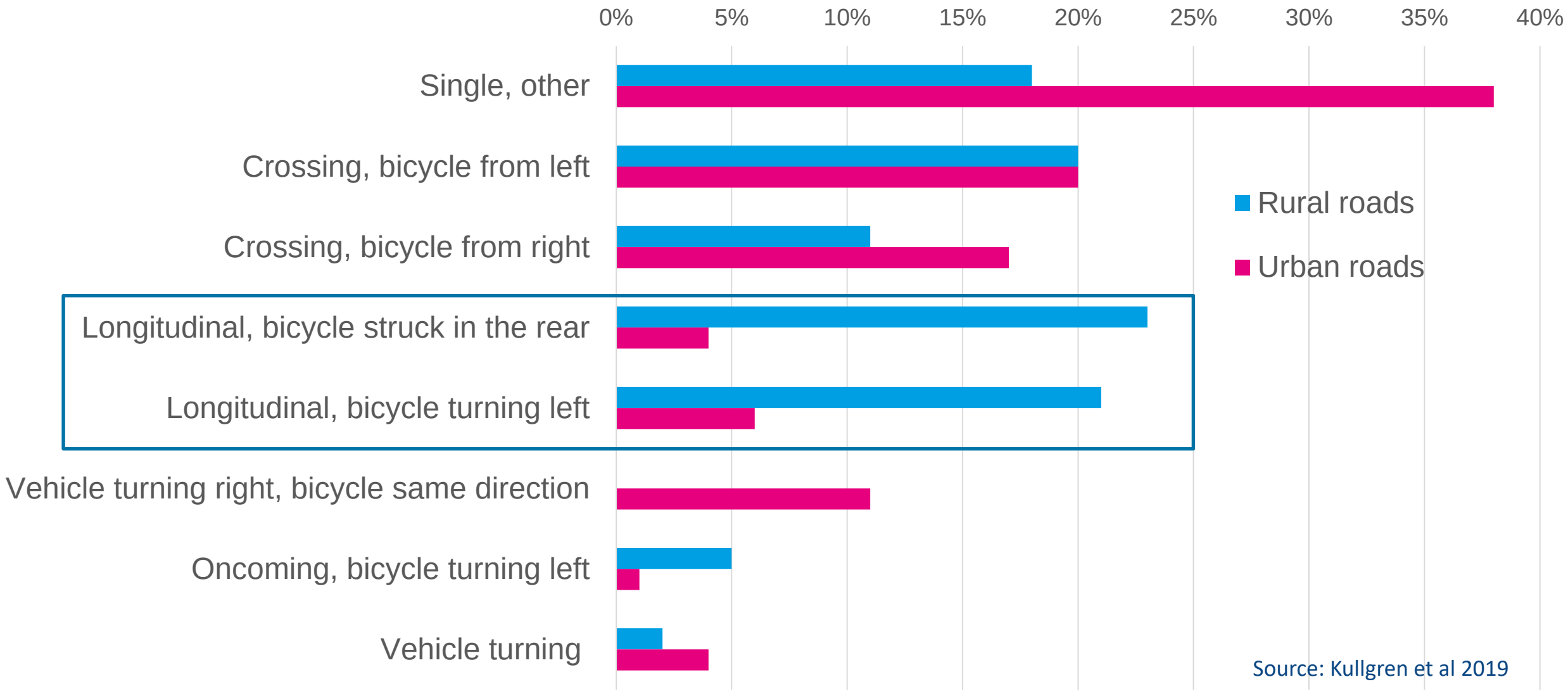
Accident type



Source: Kullgren et al 2019

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Some other descriptive findings

- 73% daylight – 21% darkness
- Alcohol: 15% of cyclists – only 3% of drivers
- Drugs: 2% of cyclists – none of the drivers
- 75% no helmet – 46% of these would survived using helmet

Source: Kullgren et al 2019

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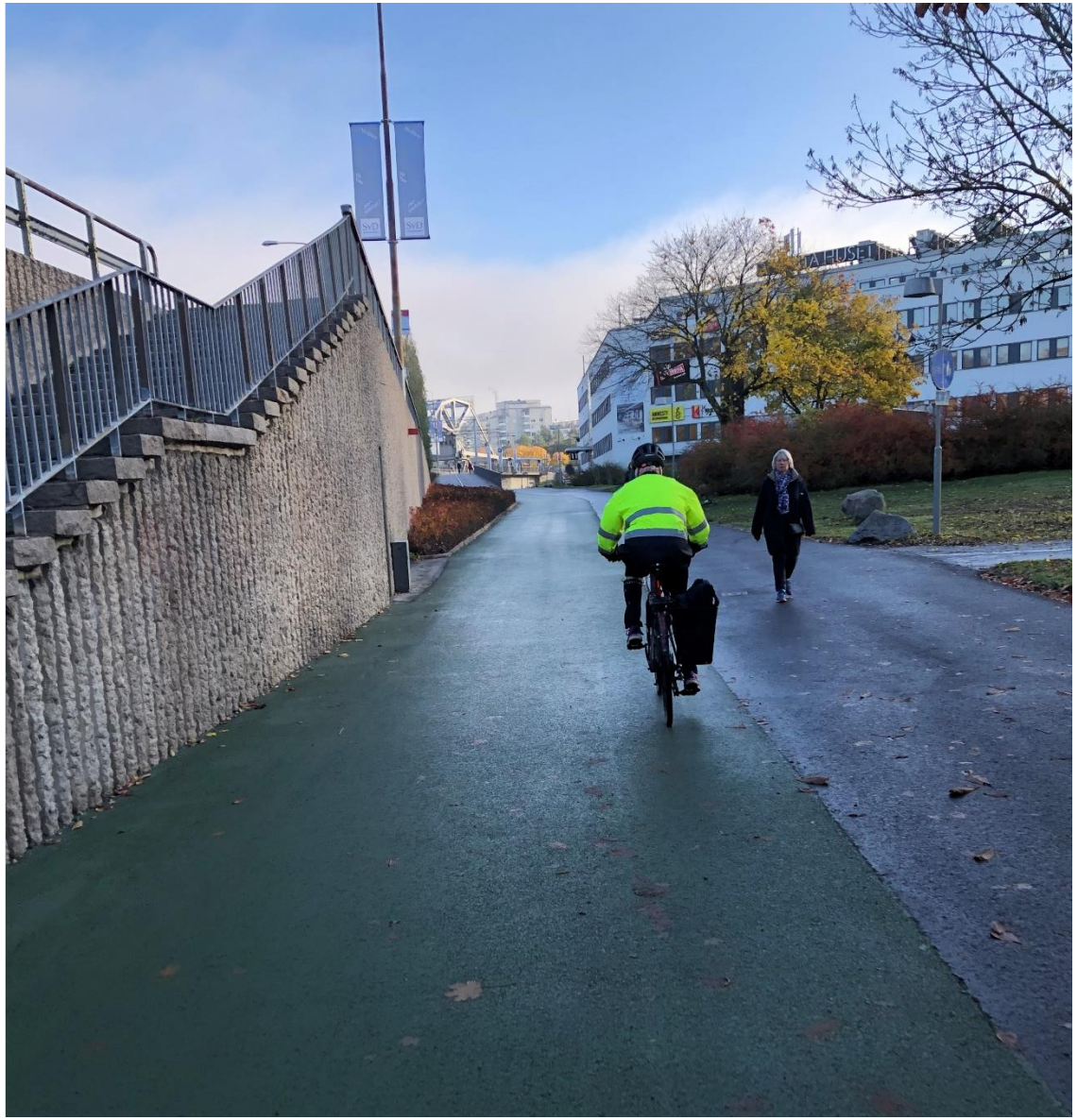
How to distinguishes riders from their surroundings? – Biomotions

- By highlight moving body parts with fluorescent or reflective material both the prediction of the cyclist’s intention and possibility for detection increases
- Biomotion will increase cyclist's likelihood of being seen by up to 88%

Source: P. Hemeren 2018



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How can we influence cyclists' clothing?

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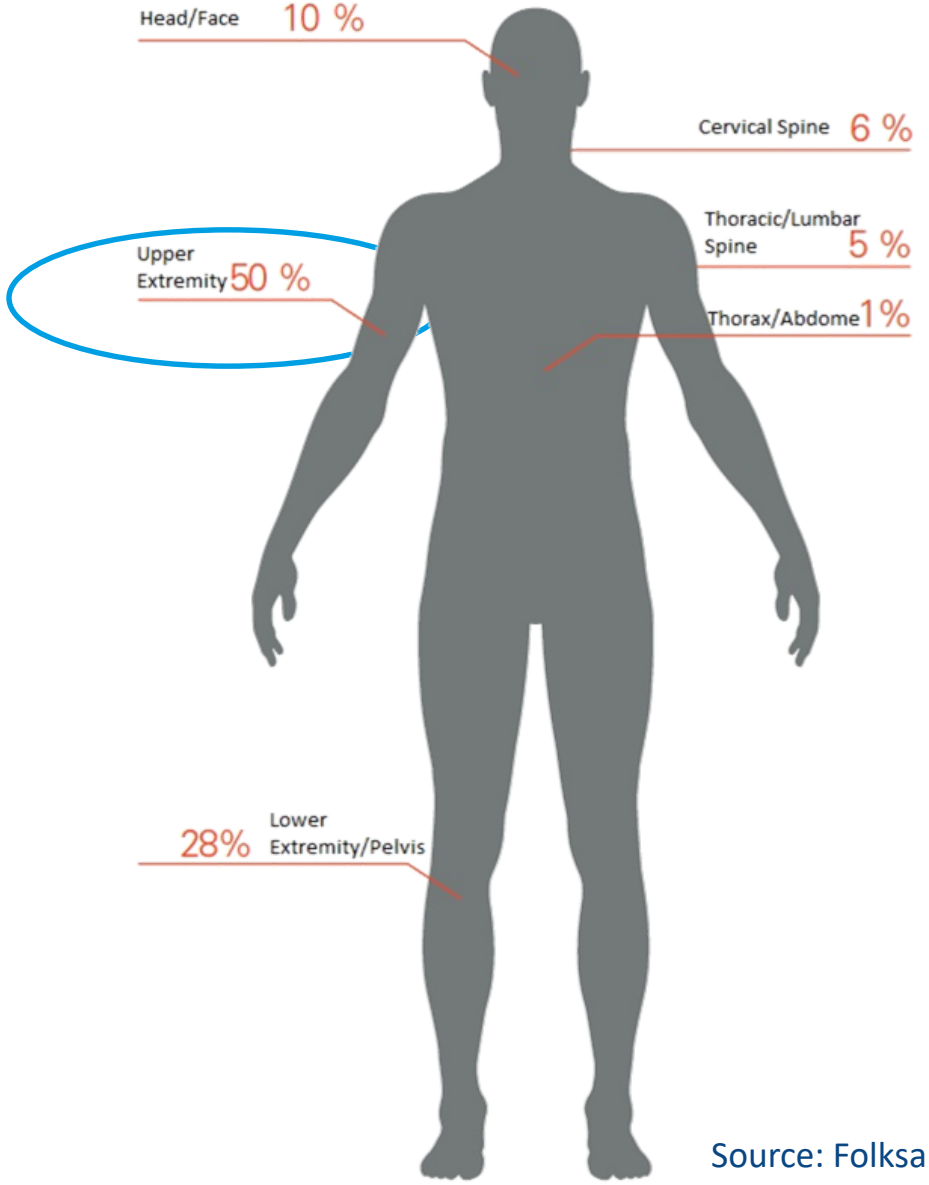
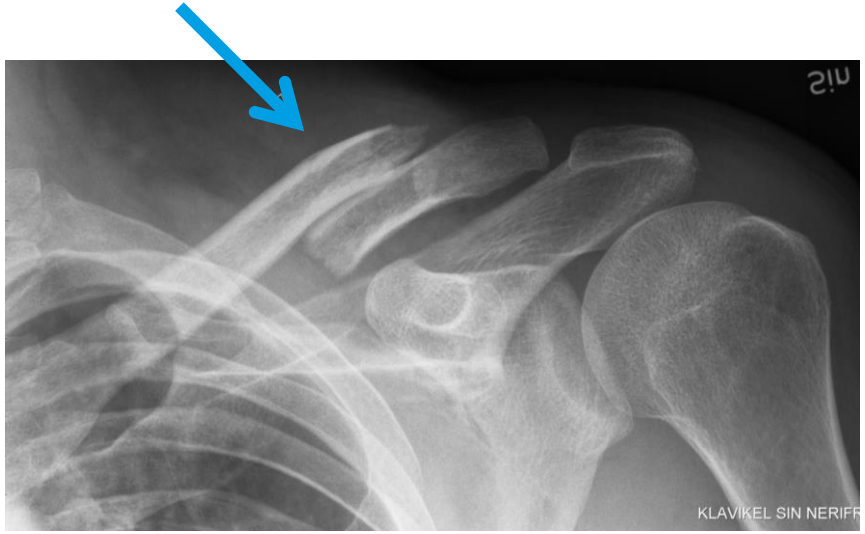
Research Questions

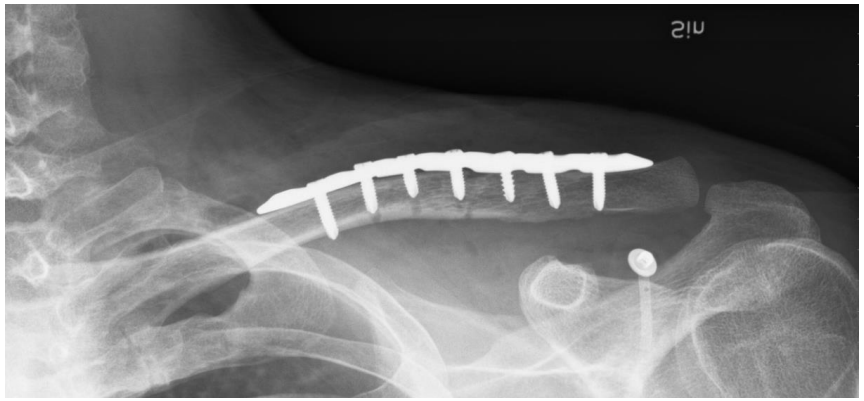
- How can we increase the ability of driver to detect cyclist in daylight conditions and thereby reduce the seriousness of injuries in case of a crash?
- What are the requirements on a shoulder protection system against injuries to make it both protective and accepted?

Prevent most common injury



Source: Folksam





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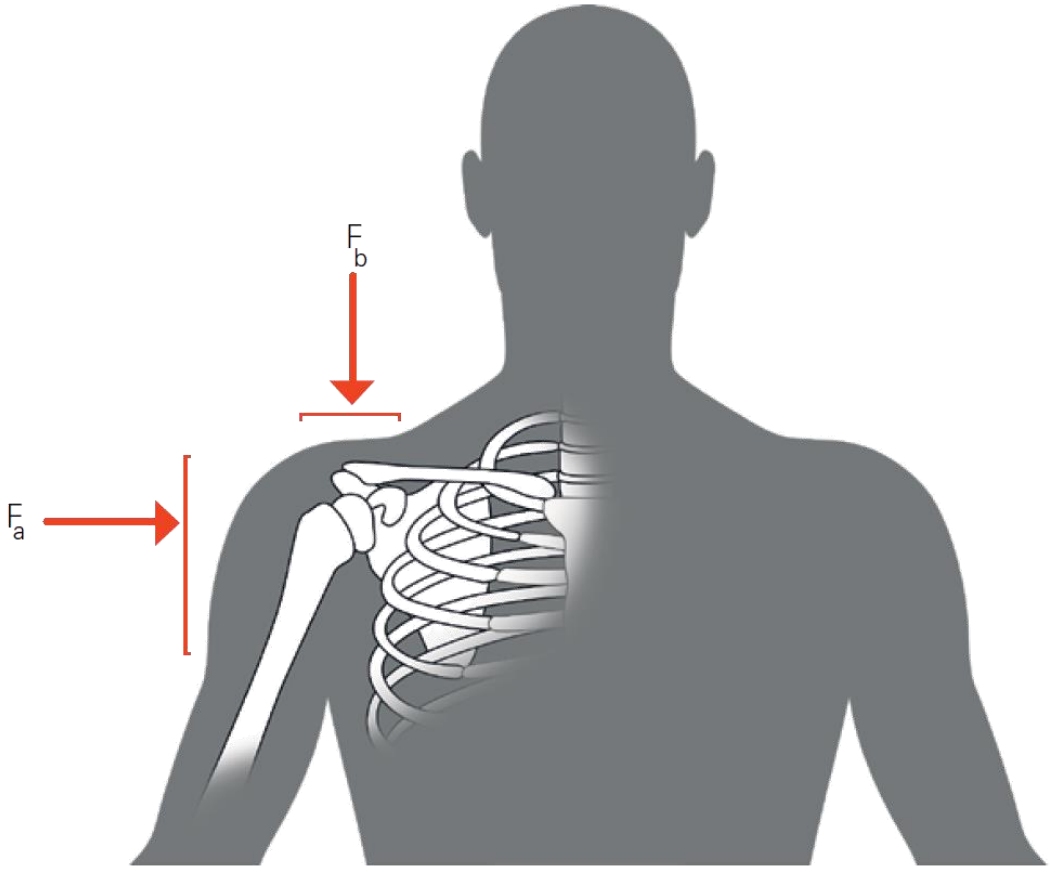
Injury Mechanisms and Strategies to Prevent Injuries to Upper Extremities

- 90% was result from a fall onto the shoulder or direct hit of the clavicle
- 8 out of 10 reported falling sideways
- Could shoulder pad reduce impact force and thereby reduce injury risk?

Source: Stigson et al 2014



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What happens with the shoulder during impact?
– Simulations with a Falling Model

Source: Stigson et al 2016

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WorldSID without shoulder protection, with existing shoulder pad jacket and a prototype airbag

Source: Stigson et al 2016

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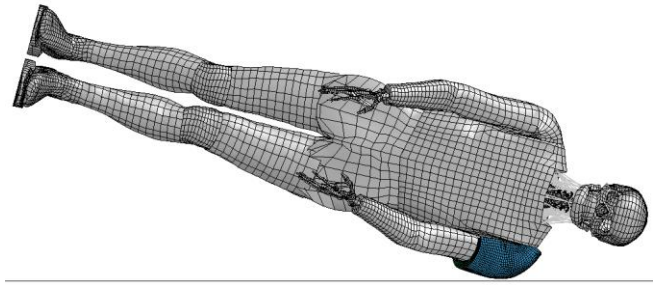
SAFER Pre-study
Partners: Folksam, VTI, Chalmers, University of Borås and University of Gothenburg (Sahlgrenska Academy)

- Experts on: competitive cycling, orthopedics, injury mechanisms, smart textiles and composite materials to identify how modern technology can aid to decrease harmful cycling accidents.



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Thank you for your attention!

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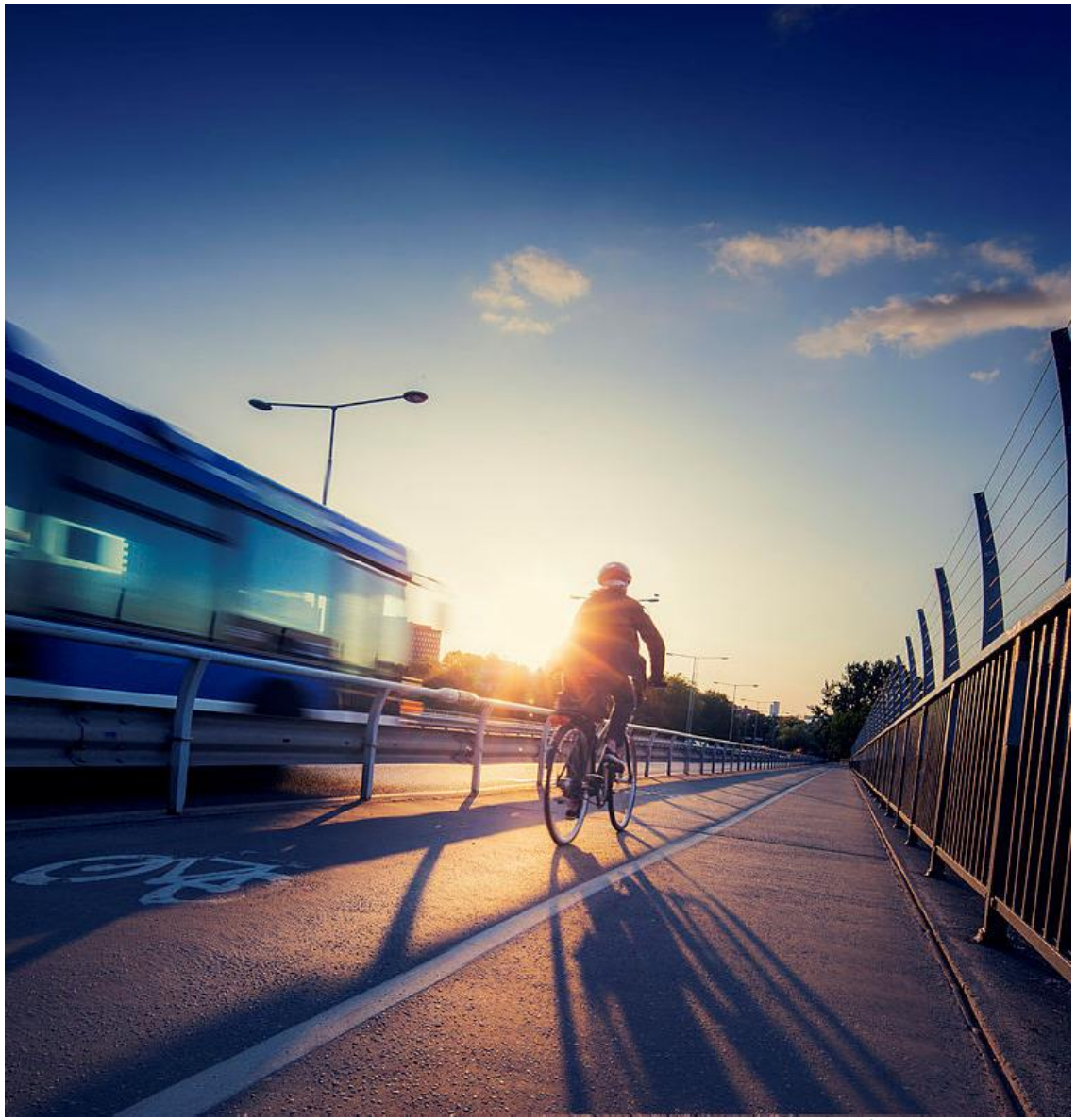

Source: Trafikverket